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Repositioning Academic Libraries as a Hub of technology enhanced learning space: Innovations and Challenges

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Repositioning Academic Libraries as a Hub of technology enhanced learning space: Innovations and Challenges

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Abstract

As the third millennium dawns, technology has profoundly changed at such a rapid pace that what is trending once may not continue the next hour and one need to keep up to date on any changes that reflect on their respective profession or within the scope of their duties.

Skills change as technology advances which is necessary for job pre- paredness, productivity, research and digital reformation. Library staff needs to be tech savvy in order to answer the broadened technology questions including computers, databases, and new media for rendering best user service. Rather than seeing technology as a threat, it must be adopted as a supporting system for information services, social networking, RSS, weblogs etc. The concept of libraries as physical space is rapidly changing to web based servers in the digital era. Library innovations evolved from the needs and motivations from the past, present and the digital future. The new generation is born into technology surrounded by an infinite number of digital devices keeping high expectations on technology driven library services.

This study explores how to make the defining technology of this century more accessible, appealing, and inviting a variety of users and learners to meet the technological demands.

Keywords: Academic Libraries, Innovation in libraries, Online Resources, ICT

Introduction

In this era of web-enabled technologies, E-learning has emerged to promote knowledge sharing amongst learners. Competencies are designed not as specific skills or tasks, but as those characteristics that a successful employee needs to be able to perform. Earlier libraries supported learning by improving educational collection, tools and facilities for reference services and books accessibility but today, libraries provide digitized collection to enhance quick and easy access and promote research works. Digital resources include databases, journals, books, pre-print archives, working papers, etc. and libraries play a vital role in creating a platform and organizing resources and new services to access from remote locations. Learners need a single interface link where they can find all resources like library catalogues, online resources, e-resources, digital resources and discussion forums. Libraries are designing their web portals and assisting the patrons in searching and retrieving information on their desktops. Innovation and transformation are important concepts in today's libraries especially in light of the libraries' ongoing transition from acquiring serials in print to providing access electronically, thus moving towards the virtual library (Carr, 2009). There are three key reasons why libraries should innovate; the need to adapt to a changing environment; the need to improve existing products and services and the need to make use of new opportunities (Elves, 2015).

Current technology trends in libraries

1. Mobile Application

Mobile landscape had broadened significantly and now libraries are also exploring and experimenting with this technology. Mobile devices include laptops, net books, note book computers, cell phones, audio players such as M3 Players, cameras and other items. A standard mobile device is not just a cellular phone, but a GPS navigation system, a web browser, and instant messenger system, a video gaming system, and much more. It uses radio wave, microwave, infra-red, GPS and Bluetooth to transfer data as voice, text, video, 2- dimensional barcodes and more. The technology is now available to use phones to read barcodes of RFIDs (radio frequency identifications) in the library, and OPACs are developing GIS (Geographical information systems) for reservations, fines, late notices, alerts, etc. Mobile web 2.0 and 3.0

applications for social networking for the library community enabling discussions, blogs, wikis and other features beneficial for all library developments..

The different areas of mobile applications in libraries include:

- OPACs can be accessed through mobile-optimized websites in certain libraries
- Library Short Message Service, “text-a-librarian” service
- AirPac offers a mobile version of the Innovative Interfaces to library catalog.
- M-Libraries provide an expansion of existing library-based services into the mobile domain.
- Encyclopedia Britannica Mobile, MedlinePlus Mobile, WorldCat Mobile are some of the Mobile Website Applications.

Mobile technology is a boon to the libraries, which help to reach the remote users to enhance library services. Although Mobile technology is a great promise for library services, there are some barriers like-

* Digital rights management

* Access to information in the digital age

* Limited memory of mobile devices

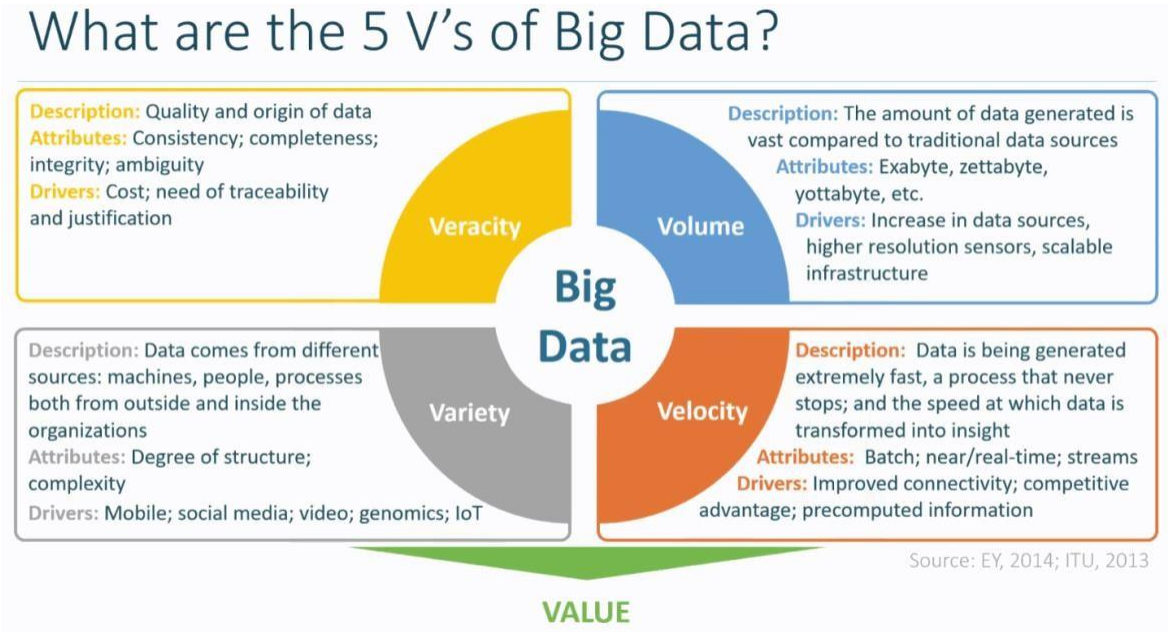
* Usually expensive and resource intensive

* Content ownership and licensing

2. Big data

The digitization of our world is advancing relentlessly and humankind is producing ever more data. Big Data is influenced by massive volume of information, its management, and processing, storage system, quality improvement & problem solving in libraries. Libraries can use big data to create personalized user experience considering the privacy issues.

According to International Data Corporation(IDC): "Big data technologies describe a new generation of technologies and architecture designed to economically extract value from very large volumes of a wide variety of data enabling high velocity capture, discovery and/or analysis."



Big data can be characterized by 4vs

VOLUME:Big data is very huge in size. Traditional software can handle megabyte and kilobyte sized data sets, while big data tools can handle terabyte and peta byte sized data sets.

VELOCITY: Velocity covers the speed in which data is created, for example Twitter data, Post and likes on FB etc.

VARIETY: Refers to many types and sources of data that can be structured or unstructured. Earlier data used to be stored in sources like spreadsheets and database and now available in different forms like emails, photos, videos, monitoring devices, PDF's, audio etc.

VALUE: Refers to the source of big data, ie, its accuracy and reliability. The challenge is in identifying, transforming and extracting that valuable data for analysis.

VIABILITY: it is important to access the viability of data in order to build an effective predictable model from the varieties.

VERACITY: The veracity determines the accuracy of the data.

Big data analytics could be applied for

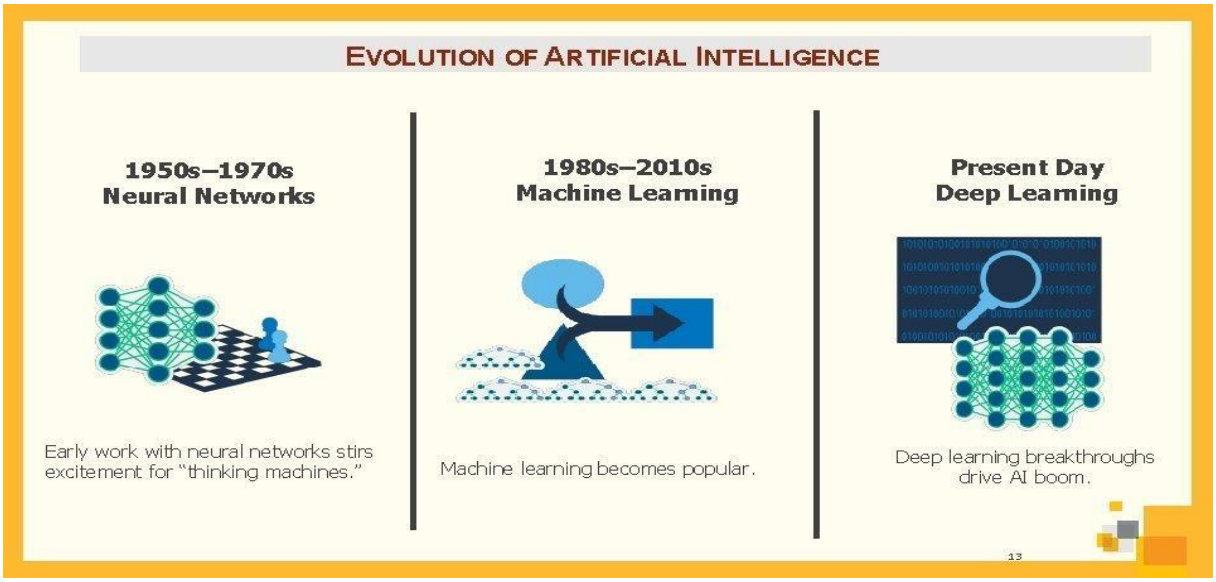
- Data mining and text analytics on the past loan records and book, bibliographies could enhance search results and recommendations.
- It would help in forecasting demand for new existing titles.
- The technology would optimize to plan the category mix in the collection by taking into consideration the space and budget constraints.
- Big Data can help libraries in better decision making, regarding demand-driven collection development, library space management & usage tracking.

The challenges that are experienced include data accuracy, data confidentiality and security, lack of skills to deal with data reduction and compression, and the unavailability of big data processing systems and technology in libraries. The author recommends the up skilling of librarians so that they are able to deal with the challenges of working with big data applications.

3. Artificial Intelligence (AI)

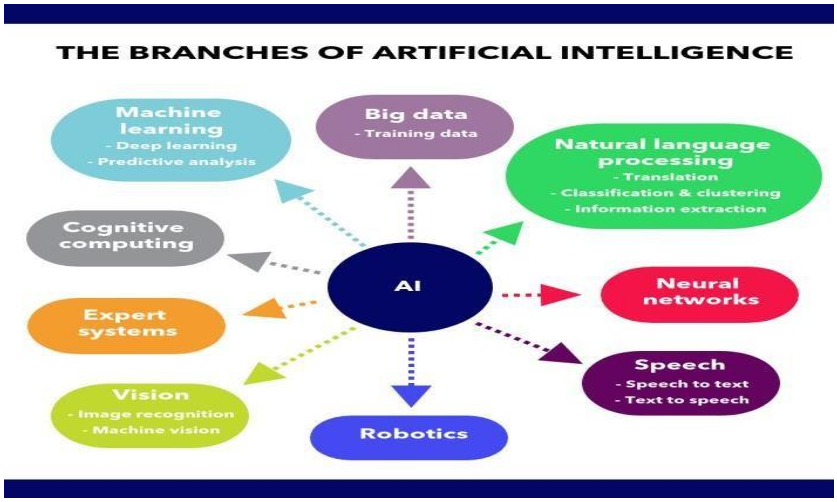
Artificial intelligence is a wide-ranging branch of computer science, so far one of the most complex and impressive human inventions. Artificial intelligence (AI) is the broad science of mimicking human abilities and machine learning is a specific subset of AI that trains a machine how to learn. Natural language processing (NLP) is a branch of artificial intelligence that helps computers understand, interpret and manipulate human language. AI performs frequent, high-volume, computerized tasks, reliably and without fatigue. Artificial Intelligence has also entered

libraries to handle directional questions on a library website, alert when a book is due, and point a user to relevant library resources or answer simple informational requests. Machine learning and sound- image-recognition technologies are being used to analyze digital collections and entities assign metadata and enable non-textual search. Libraries can use AI tools to provide deep intelligence to reshape their services and help patron's access specific information more easily and quickly.



How AI shaping the world of libraries:

1. Automatic cataloguing and classification using Optical Character Recognition (OCR)
2. Automatic translation of foreign language materials using Natural Language Processing (NLP)
3. Automatic indexing using Expert Systems
4. Retrieval of audiovisuals materials Optical Character Recognition and Speech Recognition.
5. Interactive bibliographic instruction using various media
6. Intelligent gateways to online sources,
7. User-structured information environment
8. Portable computer reader services for the handicapped



The application of robots in library activities is one of the current trends in the application of artificial intelligence in libraries. Many large libraries are using robotic system to store, retrieve and shelf-reading materials and inventory management. For example, libraries can use robots to greet visitors and answer directional questions. University of Pretoria Libraries in South Africa has a robot named Libby that already performs such tasks.

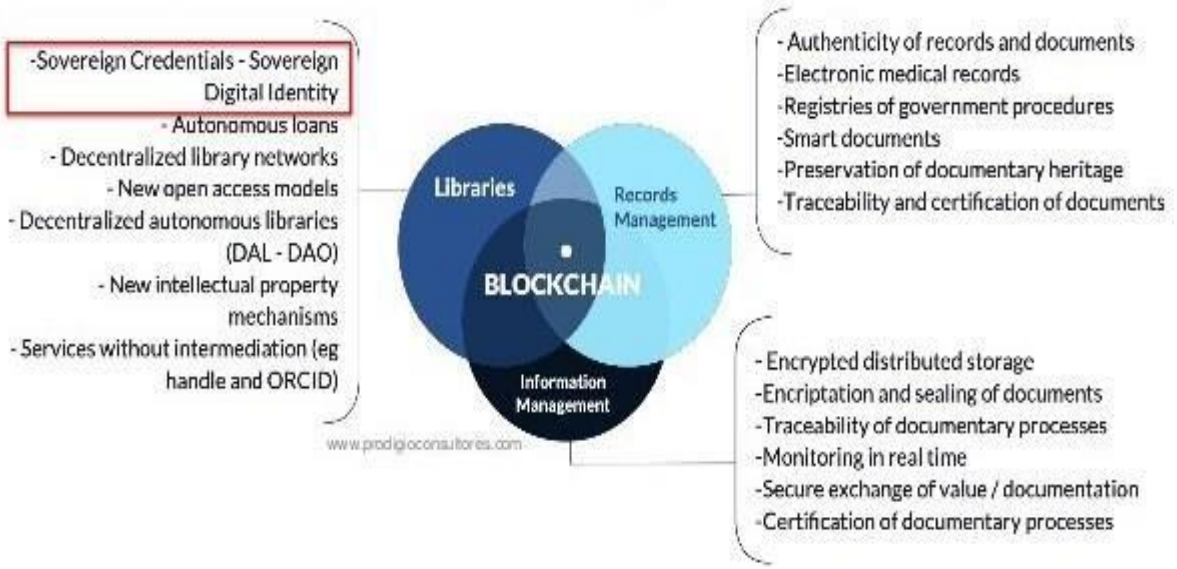
Libraries are embedding Radio Frequency Identification (RFID) tags into their collections. AI benefits best customer service through email, live chat, social media, etc. AI has enabled vast advancement in online platforms like video conferencing, online meetings, lectures, presentations which are an additional tool to academic activities.

Google's Life Tags project is a searchable archive of Life magazine photographs that used artificial intelligence to attach hundreds of tags to organize the archive. [1] Another Google project, Talk to Books, lets users type in a statement or a question and the system retrieves whole sentences in books related to what was typed, with results based not on keyword matching, but on more complex training of AI to identify what a good response looks like. [2]

4. Blockchain technology

Blockchain Technology is increasingly being adopted in libraries in various ways like for creating an enhanced metadata system, protecting, sharing and collection maintenance. A blockchain is a growing list of records, called blocks that are linked using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp, and transaction data

generally represented as a Merkle tree (Wikipedia, 2019a). It can be regarded as a public ledger, in which all transactions are stored in a chain of blocks (Zheng, Xie, Dai, Chen, & Wang, 2018).



Blockchain technology is opening new opportunities like;

- Digital preservation and tracking
- Community-based collections to share objects, tools, and services
- Blockchain-based currencies for international financial transactions (IFLA)
- Inter Library Loan and Voucher System
- Library card
- Archives/special collections where provenance and authenticity are essential
- Corporate library records keeping
- Organizational data management
- Intellectual property for R&D, etc

5. Internet of Things (IOT)

IoT is transforming the informative academic world smarter, Secure and responsive with the digital- physical devices. Kevin Ashton coined the phrase 'Internet of Things' in 1999, although it took at least another decade for the technology to catch up with the vision."The IoT integrates

the interconnectedness of human culture -- our 'things' -- with the interconnectedness of our digital information system -- 'the internet.' That's the IoT," Ashton told ZDNet. Adding RFID tags to expensive pieces of equipment to help track their location was one of the first IoT applications

Advantages of IoT include the following:

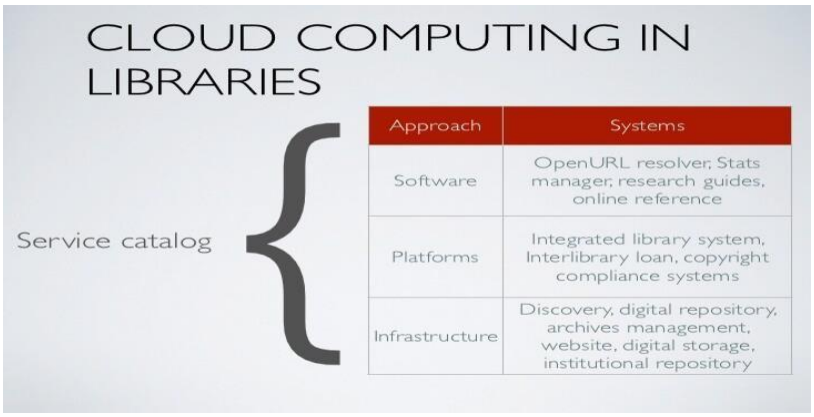
- ability to access information from anywhere at any time on any device;
- improved communication between connected electronic devices;
- transferring data packets over a connected network saving time and money; and
- automating tasks helping to improve the quality of a business's services and reducing the need for human intervention.

Disadvantages of IoT include the following:

- As the number of connected devices increases and more information is shared between devices, the potential that a hacker could steal confidential information also increases.
- Enterprises may eventually have to deal with massive numbers -- maybe even millions -- of IoT devices, and collecting and managing the data from all those devices will be challenging.
- If there's a bug in the system, it's likely that every connected device will become corrupted.
- Since there's no international standard of compatibility for IoT, it's difficult for devices from different manufacturers to communicate with each other.

6. Cloud computing

Cloud computing is independent of location network connectivity. It describes the software applications that exist online and are available to multiple users via the Internet, rather than on a particular user’s local computer.



Magic mirror

It consisting of camera, sensor with Wi-Fi enabled provides interaction between people and computers. This technology can be applied to diverse information, such as location recognition, review of the contents, similar like material [3].

Pressure pad sensor

Pressure pad sensor consist of a thin sheet sensor pad enabled with Wi-Fi technology connected to processing unit which records and controls the system. Frequent movement of the user in particular aisle is recorded so that the collection of books of recorded section can be increased to provide sufficient information.

In application level, there are many challenges. Along with security and privacy, standardization is also a great dispute for the adoption of IoT in libraries.

7. SOCIAL NETWORKING

MySpace: Library users can use html to customize their profile and they can add new graphics and videos on it.

Face book: Face book helps in marketing of services and products, users can be informed with different upcoming events and share the information about their new arrivals and editions of books. Ask-A –Librarian service can be exploited by using it.

Twitter: Is a free social networking used to send and read messages known as tweets. Librarians can highlight new materials, new groups, meetings and more with some of these suggestions through twitter.

LinkedIn: It is a professional networking site used by the librarians to create professional connections, market library services and share their ideas, events and activities among other library professionals spread all over the world.

Blog: Libraries can use Blogs to keep their users aware with the latest developments in the field of library related matter. Blogs can be subscribed through RSS feeds.

Wikis: The most recognized wiki is Wikipedia. Wikis can be used for :

- ✓ Collaborative work
- ✓ Publication of historical photos and information
- ✓ Building relation between librarian and user

Ajax: In libraries web pages can update frequently with new messages with help of Ajax- part of Web 2.0, without reloading the entire browser page.

Mashups: It is hybrid of different social media which helps to edit OPAC data and metadata and create a user driven catalogue.

YOUTUBE: Libraries can announce their different programs, conferences, workshops, seminars, Virtual conferences by uploading their videos on the YouTube.

RSS: stands for Really Simple Syndication and help you stay up-to-date with your favorite newscasts, blogs, websites, and social media channels.

8. Library bookmark apps

An interesting approach from a Chinese design company Toout. This little tiny device is in the first place a regular bookmark, which can keep track of all borrowed books, as well as remind the user of the return dates.

Nimble is an advanced library augmented reality tool, designed by a London-based interactive designer and Google engineer Sures Kumar.

9. Augmented reality

The system offers searching, locating an navigating with the digital interface on physical space. The app, which is simple and useful will the take the user to the exact location of the book in the rack, point out new arrivals and similar books.

10. Digital interfaces for printed books

Searching the content of the, looking for a reference on the web, getting an instant translation, writing notes, or collecting book passages – all these can be done by enhancing a digital interface to the print book.

11. Mobile library center

Is a revolutionary concept developed by Librarians Without Borders, to reach people in refugee camps and impoverished countries .The library box is a portable toolkit includes 250 paper books, 50 e-readers with thousands of ebooks, and a variety of educational apps.

Conclusion

As technology continues to advance, people prefer libraries to serve as hubs for community members to interact and engage. When libraries have to fold with new tech initiatives, challenges like funding and data privacy will inevitably crop up. Libraries are creating ample learning opportunities through emerging technology spaces to meet their personalized needs at their finger tips.

Libraries have redesigned and providing variety of information services using modern and cutting edge technologies, reaching their users through social networking and digital media. Academic libraries are no longer restricted themselves to traditional services, rather they facilitate social networking, such as Facebook, Twitter, SMS (Short Messaging Service) and online chat services with free wireless access to the Internet and scholarly literature through remote login . The libraries in higher education are adapting to new technologies for better services in new found digital environment. Effective use of technology and data can shape and enhance the customer experience smarter.

Obviously, libraries role in academic research is going through a clear transformation in the 21st century with the most promising and growing applications of digital platform. The advent of technology has ironically contributed to the decrease of reading culture. On the other hand technology has greatly transformed the world with steady growth, awareness and innovations and more integrated with society.

Innovations will help digital data management that will improve the way patrons discover content and citations, making it more accessible and display of relevant resources. To conclude, libraries are trying to find their footing in a new marketplace where learning and teaching techniques are dramatically changing and unlimited information is available at the click-of-a-mouse. These innovations could help libraries to more effectively preserve and mine their collections online, and redefine access for researchers.

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